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| APPLICATION NO.                  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|----------------------------------|-------------|----------------------|---------------------|------------------|
| 09/690,600                       | 10/17/2000  | Peter B. Hogerton    | 53434USA8C.009      | 2568             |
| 32692                            | 7590        | 03/25/2004           | EXAMINER            |                  |
| 3M INNOVATIVE PROPERTIES COMPANY |             |                      | THAI, LUAN C        |                  |
| PO BOX 33427                     |             |                      |                     |                  |
| ST. PAUL, MN 55133-3427          |             |                      | ART UNIT            | PAPER NUMBER     |
|                                  |             |                      | 2827                |                  |

DATE MAILED: 03/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/690,600

Applicant(s)

HOGERTON ET AL.

Examiner

Luan Thai

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 1-15 and 20-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/17/00 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

This Office action is responsive to the amendment filed March 10, 2004.

Claims 1-23 are pending in this application.

Claims 1-15 and 20-23 have been withdrawn from consideration as being directed to a non-elected invention.

### ***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims **16-19** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The specification, as originally filed, does not disclose that *the conductive bumps being metallurgically bonded to the integrated circuit chip*, as recited in amended claim 16. In fact, applicant's specification recites that: "the IC may be metallurgically bonded to the substrate" (Applicant's Specification, page 1, line 32 and page 2, line 1); or "A typical assembly process for flip-chip assembly involves the following steps: 1) flux paste is applied to the substrate bond pads; 2) the IC is aligned and placed on the substrate while the tackiness in the flux holds the

*chip in place; 3) the assembly is passed through the reflow oven and the solder melts and bonds metallurgically with the substrate pads; and 4) the sample is passed through a flux cleaning operation” (page 2, lines 21-26).*

Claims **17-19** are rejected since each includes the limitations of independent claim **16**.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsubara et al. (JP-402023623A, Applicant's submitted prior art, of record) in combination with Japan patent JP-07130749A (called “JP-749”).

Regarding claims 16 and 18-19, Matsubara et al. disclose (see specifically figures 1 and 2(3)) an integrated circuit chip (7) comprising: a bumped side (e.g., the top side) having a passivation surface with a passivation layer (3) formed thereon, a plurality of conductive bumps (5) made of gold (see page 5, the last paragraph of the translation) and disposed on the passivation surface; a layer of adhesive (8) covered the bumped side of the integrated circuit chip (7), the adhesive (8) having an primary surface that is substantially parallel to the passivation surface, and the conductive bumps (5) having exposed contact regions that are not covered by the adhesive (8), wherein the exposed contact

regions of the conductive bumps (5) have a rounded profile (see figure 1), and wherein the conductive bumps (5) having heights greater than a thickness of the adhesive (8). Matsubara et al. disclose all the limitations of the claimed invention including the bumps (5) being bonded to the IC chip (7) but fail to explicitly teach that the conductive bumps are metallurgically bonded to the integrated circuit chip.

“JP-749” while related to a similar electronic parts joining design teaches a metallurgically stabilized bonding being formed by pressure welding in order to reduce the damage on the joined items (see the “Abstract” and the “Advantage”). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply “JP-749” teachings to Matsubara et al.’s device by metallurgically bonding the conductive bumps to the integrated circuit chip in order to reduce the damage on the joining point.

Regarding claim 17, although the proposed device of Matsubara et al. and “JP-749” does not explicitly teach *“the surface of the adhesive being polished”*, this limitation is taken to be a product by process limitation, and it is the patentability of the claimed product and not of recited process steps, which must be established. Therefore, when the prior art discloses a product, which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*,

180 USPQ 324,326(CCPA 1974); In re Marosi et al., 218 USPQ 289,292 (Fed. Cir. 1983); and particularly In re Thorpe, 227 USPQ 964,966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process ” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in “product by process” claim or not.

3. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsubara et al. (JP-402023623A, Applicant’s submitted prior art, of record) in combination with Yeh et al (5,607,099).

Regarding claims 16 and 18-19, Matsubara et al. disclose (see specifically figures 1 and 2(3)) an integrated circuit chip (7) comprising: a bumped side (e.g., the top side) having a passivation surface with a passivation layer (3) formed thereon, a plurality of conductive bumps (5) made of gold (see page 5, the last paragraph of the translation) and disposed on the passivation surface; a layer of adhesive (8) covered the bumped side of the integrated circuit chip (7), the adhesive (8) having an primary surface that is substantially parallel to the passivation surface, and the conductive bumps (5) having exposed contact regions that are not covered by the adhesive (8), wherein the exposed contact regions of the conductive bumps (5) have a rounded profile (see figure 1), and wherein the conductive bumps (5) having heights greater than a thickness of the

adhesive (8). Matsubara et al. disclose all the limitations of the claimed invention including the bumps (5) being bonded to the IC chip (7) but fail to explicitly teach that the conductive bumps are metallurgically bonded to the integrated circuit chip.

A conductive bump being metallurgically bonded to an integrated circuit chip, however, is conventionally applied in semiconductor art, specifically in flip-chip bonding art, as taught by Yeh et al., Col. 5, lines 18+ (see figures 1-3). It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the metallurgical bonding process to Matsubara et al.'s device, since such process is conventionally applied in the art, as taught by Yeh et al, and held to be within the ordinary designing ability expected of a person skilled in the art.

Regarding claim 17, although the proposed device of Matsubara et al. and Yeh does not explicitly teach "*the surface of the adhesive being polished*", this limitation is taken to be a product by process limitation, and it is the patentability of the claimed product and not of recited process steps, which must be established. Therefore, when the prior art discloses a product, which reasonably appears to be identical with or only slightly different than the product claimed in a product-by process claim, a rejection based on sections 102 or 103 is fair. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324,326(CCPA 1974); *In re Marosi et al.*, 218 USPQ 289,292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964,966 (Fed. Cir.

1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See also MPEP 2113. Moreover, an old or obvious product produced by a new method is not a patentable product, whether claim in “product by process” claim or not.

5. The following reference(s) is/are cited as of interest to this application:

U.S. Pat. No. 4,577,798 (Col. 2, lines 39+) to Rainville and U.S. Pat. No. 5,155,325 (Col. 1, lines 9+) to McCleaf et al. is/are cited for showing the pressure welding is appeared to be “a metallurgical bonding”.

### ***Conclusion***

6. Applicant’s arguments with respect to claims **16-19** have been fully considered, but they are deemed to be moot in view of the new grounds of rejection.

7. Applicant’s amendment necessitated the new ground(s) of rejection presented in this Office action because the newly added limitations (e.g., the underlined portions) in independent claim 16 raise new issues that would require further consideration and/or search. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not



Art Unit: 2827

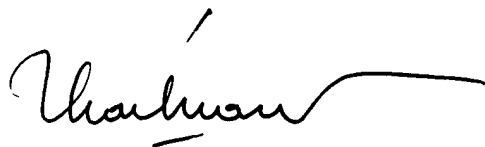
mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is 571-272-1935.

The examiner can normally be reached on 6:45 AM - 4:15 PM, Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on 571-272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Luan Thai', with a long horizontal flourish extending to the right.

Luan Thai  
March 17, 2004